



October 2005
(Updated May 2006)

**CONDITIONAL SHORT-TERM USE LEVEL DESIGNATION
FOR
BASIC (TSS) TREATMENT**

For

**CONTECH Stormwater Solutions Inc. VortFilter®
Using "Fine" Perlite Media
And Operating at 9 GPM per Cartridge**

Ecology Decision:

Based on the CONTECH Stormwater Solutions Inc. (CONTECH) application submissions and recommendations by the Technical Review Committee (TRC), Ecology hereby issues a Conditional Short-Term Use Level Designation (CUD) for the VortFilter®:

- As a basic stormwater treatment practice for total suspended solids (TSS) removal,
- using Fine perlite media,
- sized at a design rate of 9 GPM per cartridge.

By issuing this 2-year designation, Ecology's position is that CONTECH should be able to demonstrate, through additional laboratory and field testing, that the VortFilter® can attain Ecology's Basic Treatment goal, thereby earning a General Use Level Designation (GULD).

This designation expires October 1, 2007, and is subject to the conditions specified below.

Use Conditions:

VortFilter® systems shall be designed, installed, and maintained to comply with these conditions:

1. VortFilter® systems containing "Fine" perlite mix are conditionally approved for basic treatment at 9 GPM maximum flow rate per cartridge at the 15-minute water quality design flow rate (as specified in Ecology's most recent Stormwater Manual), as calculated using an acceptable continuous

simulation runoff model (such as the latest versions of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model (e.g. MGSFlood). Note that if single-event methods are used to estimate runoff flowrates, Figures 9.6a and 9.6b in Volume V of the 2005 Stormwater Management Manual for Western Washington should be used to adjust the approved hydraulic loading rate of 9 GPM. This is done by multiplying the above hydraulic loading rate by the ratio indicated in Figure 9.6a for on-line designs, or Figure 9.6b for off-line designs. The 6-month, 24-hour rainfall amount for the project site must be known to identify the appropriate ratio. The adjusted hydraulic loading rate is divided into the peak 10-minute flow rate predicted by the single-event method to compute the number of cartridges necessary. This approval applies to urban land uses where stormwater influent TSS concentrations are expected to be 500 mg/L or less and TSS particles are not unusually fine (in the clay size range).

2. For proposed VortFilter[®] systems downstream of a stormwater detention facility, the VortFilter[®] size shall be calculated using both the flow-based and mass-based methods as described in the CONTECH *Product Design Manual Version 4.1 (April 2006)*, or most current version, and the designer shall select the result yielding the larger number of cartridges.
3. VortFilter[®] systems shall be installed in such a manner that flows exceeding 18 GPM per cartridge are bypassed externally to prevent resuspension of previously captured sediments. VortFilter[®] systems shall be designed in accordance with the performance goals in Ecology's 2005 Stormwater Manual and CONTECH *Product Design Manual Version 4.1 (April 2006)*, or most current versions, unless otherwise specified. The design, pretreatment, land use application, and maintenance criteria in the VortFilter[®] Technical Design Manual must be closely followed.
4. Pretreatment of TSS and oil and grease may be necessary, and shall be provided in accordance with the most current versions of the CONTECH *Product Design Manual Version 4.1 (April 2006)* or the applicable Ecology Stormwater Manual, and using the performance criteria and pretreatment practices provided on Ecology's "Evaluation of Emerging Stormwater Treatment Technologies" website.
5. Maintenance includes removing accumulated sediment from the vault, and replacing spent cartridges with recharged cartridges.

Inspections will be used to determine site-specific maintenance schedules and/or requirements. When inspections are performed, the following findings shall serve as maintenance triggers:

- (a) Accumulated vault sediment depth exceeds an average of 6 inches, or

(b) System is visibly operating in bypass mode during sub-design flow conditions (indicates cartridges are clogged).

Note: If excessive floatables (trash, debris, oil) are present, perform a minor maintenance consisting of gross solids removal, not cartridge replacement.

6. CONTECH shall maintain readily available those reports listed under “Application Documents” (below) as public. CONTECH shall provide links to this information from its corporate website, and make this information available on CD-ROM upon request, at no cost and in a timely manner.

7. Fine Perlite media used shall approximate the following specifications:

Each cartridge contains a total of approximately 2.6 cubic feet of Fine Perlite media. This perlite media shall be made of natural siliceous volcanic rock free of any debris or foreign matter. The expanded perlite shall have a bulk density ranging from 6.5 to 8.5 lbs per cubic foot and particle sizes ranging from 0.09” (#8 mesh) to 0.38” (3/8” mesh).

8. A Quality Assurance Project Plan (QAPP) supporting General Use Level Designation (GULD) testing shall be submitted to Ecology by March 31st, 2006.

9. CONTECH shall complete all required testing and submit a TEER to the TRC and Ecology for GULD review by October 31, 2007.

10. CONTECH may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.

11. Discharges from the VortFilter® shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: CONTECH Stormwater Solutions Inc., Manufacturer and Vendor

Address of Applicant: 12021B NE Airport Way
Portland, OR 97220

Application Documents:

The applicant’s master report, titled, “VortFilter® Technology Report, prepared for Washington Department of Ecology, April 2005”, provides the required elements of a TEER, and includes several appendices:

- Appendix 1: Details

- Appendix 2: Buoyancy Calculations
- Appendix 3: Specifications
- Appendix 4: Sizing Calculations
- Appendix 5: Design Drawings
- Appendix 6: Perlite Gradation
- Appendix 7: Port Orchard Field Data
- Appendix 8: Sump Depth Vs. Performance

Above-listed documents are available by contacting Stormwater360

Applicant's Use Level Request: That Ecology grant a Conditional Short-Term Use Level Designation as a Basic Treatment practice at 12 gallons per minute (GPM) per cartridge.

Applicant's Performance Claim: The laboratory data obtained through Sil-Co-Sil 106 silica product (U.S. Silica) testing, combined with field data from 6 storms at the Port Orchard, WA site, demonstrate the VortFilter[®] can achieve the required 80% total suspended solids (TSS) loading reduction at a flow rate of 12 GPM per cartridge.

Technical Review Committee Recommendations: The TRC, based on the weight of the evidence and using its best professional judgment, finds

- Sufficient evidence that Stormwater360 should be able to demonstrate, through additional laboratory and field testing, that the VortFilter[®] can attain Ecology's Basic Treatment goal and receive a GULD.
- That the VortFilter[®] design and operational characteristics appear to be sufficiently similar to a media filtration system previously approved by Ecology and the TRC, such that a Conditional Short-Term Use Level Designation is appropriate.
- In light of the limited field test data and monitoring programs currently in progress, and to assure equity with previous media filtration system designations, the TRC suggests that Ecology specify a conservative operating rate of 9 GPM per cartridge. Based on laboratory information, this hydraulic loading rate would achieve greater than 80% removal of Sil-Co-Sil 106 sediment. Results of future field performance evaluations may provide a basis for increasing or decreasing this design hydraulic loading rate to ensure the achievement of Ecology's solids removal goals.
- The VortFilter[®] is deemed satisfactory with respect to factors other than treatment performance (e.g., maintenance).

Findings of Fact:

- Stormwater360 tested a single VortFilter[®] cartridge, 18-inch diameter and 18 inches tall, charged with fine perlite, and using Sil-Co-Sil 106. Six tests were completed at 12 GPM flow rate. TSS removal rates were around 85%.
- In late 2004, Stormwater360 initiated testing on a 4-cartridge VortFilter[®] at a Port Orchard, WA office site. The system is designed to treat 15 GPM/cartridge. The

system is fully instrumented and monitored pursuant to a Quality Assurance Project Plan (QAPP).

- Testing results (6 rain events) from this site found 25 to 96% TSS removal rates. Particle size data were not provided. Effluent values were consistently at or below 10 mg/L, with all influents below 100 mg/L. These results meet Ecology's TSS standard (20 mg/L effluent TSS for influents below 100 mg/L TSS).
- Stormwater360 provided information on the factors other than performance specified in Ecology's protocol. This information indicates that the VortFilter® should be satisfactory with respect to all factors.
- Stormwater360 has demonstrated that the VortFilter® should be comparable in performance and operation to media filtration systems that are already conditionally or generally approved.

Recommended Research and Development:

Ecology encourages CONTECH to pursue continuous improvements to the VortFilter®. To that end, the following actions are recommended:

- Determine, through laboratory and field testing, relationships between accumulated solids or biofouling effects in the cartridges.
- Report on anoxic conditions and their effect on the filter cartridges.
- Monitor oxygen levels to determine if better ventilation is necessary from filter vault.
- Determine the flow rate through the cartridges.
- Determine the system's capabilities to meet Ecology's enhanced, phosphorus, and oil treatment goals.
- Develop easy-to-implement methods of determining that a VortFilter® facility requires maintenance (sump cleaning and filter replacement).
- Report on metals used in the construction of the filter system and how their degradation could affect effluent water quality over time.

Contact Information:

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Applicant website: www.contechstormwater.com

Ecology web link: <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

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